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Return on Capital Employed
at Naval Dental Center Gulf Coast

By: **Michael A. Yonkers, and**
Marek Flis

December 2003

Advisors: **Joseph G. San Miguel, and**
Don E. Summers

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RETURN ON CAPITAL EMPLOYED AT NAVAL DENTAL CENTER GULF COAST

Michael A. Yonkers, Lieutenant, United States Navy
Marek Flis, First Lieutenant, Polish Army

Submitted in partial fulfillment of the requirements for the degree of

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from the

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Authors:

_____
Michael A. Yonkers

_____
Marek Flis

Approved by:

_____
Joseph G. San Miguel
Lead Advisor

_____
Don E. Summers
Support Advisor

_____
Douglas A. Brook
Dean
Graduate School of Business and Public Policy

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RETURN ON CAPITAL EMPLOYED AT NAVAL DENTAL CENTER GULF COAST

ABSTRACT

The purpose of this MBA Project is to provide a Return on Capital Employed model for Naval Dental Center Gulf Coast (NDCGC) resource managers. The model will enable the resource managers to evaluate financial and personnel assets appropriate for each dental clinic and to allocate assets as deemed necessary based on those results. NDCGC is required to report the Return on Investment (ROI) of each branch dental clinic (BDC) to the Bureau of Medicine and Surgery on a quarterly basis. NDCGC has made an effort to calculate return on assets, but there has been little understanding of the source of the income, cost and assets valuation data used in the equation. NDCGC has recognized over the past fiscal year that using the measure of Return on Capital Employed (ROCE) vice ROI will give them the assessment of alternatives to optimize the use of resources. NDCGC has requested that a model be developed to analyze ROCE at each BDC. A breakdown and analysis of the ROCE equation will enable NDCGC to provide all BDCs with proper recommendations based on the outcomes of the study on ROCE's effectiveness. This project was conducted with the sponsorship and assistance of Naval Dental Center Gulf Coast.

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I. INTRODUCTION

A. PURPOSE

The purpose of this project is to provide Naval Dental Center Gulf Coast an appropriate model to enable resource managers to evaluate financial and personnel assets at branch dental clinics. NDCGC is required to report the Return on Investment (ROI) of each branch dental clinic (BDC) to the Bureau of Medicine and Surgery on a quarterly basis. NDCGC has made an effort to calculate return on assets, but there has been little understanding of the source of the income, cost and assets valuation data used in the equation. NDCGC has recognized over the past fiscal year that using the measure of Return on Capital Employed (ROCE) vice ROI will give them the assessment of alternatives to optimize the use of resources. NDCGC has requested that a model be developed to analyze how ROCE has worked at each NDCGC's BDC, enabling NDCGC in the process to provide all BDCs with proper recommendations based on the outcome of the study on ROCE's effectiveness.

B. SCOPE AND LIMITATIONS

This project consists of a background information description of Navy Medical Department's Bureau of Medicine and Surgery, and Navy Dental Treatment Facilities. Key personnel within NDCGC are identified and discussed in detail. Also, it analyzed the unique characteristics of the BDCs' resource allocation attributes and has categorized them for this analysis. It has applied one fiscal year of BDC Net Income (NI), Sales Revenue, and Capital Employed (CE) to the ROCE model. In addition, it has detailed the appropriate data for use in the model and the sources of those data. The assumptions are identified and integrated into the outcomes and recommendations to ensure the key personnel within the command interpret them appropriately. It is also the authors' intention to provide NDCGC resource managers with the spreadsheet data file for use in gathering the ROCE data for future outcome analysis.

C. LITERATURE REVIEW AND METHODOLOGY

To gather the information needed for this project a comprehensive literature search of books, World Wide Web, DOD references and other library information

resources were conducted. Also, the NDCGC comptroller and budget officer were interviewed by phone. The NDCGC resources directorate provided all data and information used in the analysis of the project.

D. MISSION OF THE NAVY MEDICAL DEPARTMENT

The Navy Medical Department is comprised of the Medical Corps, Dental Corps, Medical Service Corps, Nurse Corps, Hospital Corps, and the Dental Technicians. Navy Medicine's main mission is to administer the commands and facilities that provide medical and dental services to active duty service members and other eligible beneficiaries, as well as the activities under the Bureau of Medicine and Surgery, and other medical and dental departments of other major claimants and offices. [Ref 3]

1. Bureau of Medicine and Surgery

The Bureau of Medicine and Surgery (BUMED) is the headquarters of the Navy Medical Department. It is headed by a Medical Corps admiral, known as the Chief, BUMED, dual-hatted as the Surgeon General of the Navy. Falling under the command of the Chief of Naval Operations (CNO), Chief, BUMED commands BUMED, and shore activities as assigned by the Chief of Naval Operations. [Ref 3]

Resource management is one of the most complex and important functions of BUMED. Working through the Assistant Chief for Resource Management/Comptroller, BUMED formulates principles and policies, and prescribes procedures and systems that will give it power to exercise effective control over the financial operations of the BUMED claimancy. Furthermore, BUMED justifies and ensures optimum use of resources for the efficient delivery of health care. In addition, BUMED also develops and maintains an integrated fiduciary system that is both accurate and responsive to the Office of the Chief of Naval Operations, Navy Comptroller, Office of the Secretary of Defense, Office of Management and Budget, and Congress.

2. Navy Dental Treatment Facilities

a. Naval Dental Center

Established by authority of the Secretary of the Navy, per OPNAVINST 5450 series, a Naval Dental Center (NDC) is an established shore activity and is the principal organizational entity in the dental health care system. NDCs are Naval shore

activities operating under the command of Navy and Marine Corps responsible line commanders, who ultimately serve under the authority of echelon II Navy commanders. [Ref 3]

(1) NDC Functions.

- Provides comprehensive dental services to Navy and Marine Corps units of the operating forces, shore activities, and other authorized personnel in the assigned geographic area as prescribed by Title 10, U.S.C., and other applicable directives
- Operates assigned component dental care facilities
- Ensures that all assigned military personnel are both aware of and properly trained for the performance of their contingency and wartime duties
- Ensures that the clinic and its component facilities are maintained in a proper state of materiel and personnel readiness to fulfill wartime and contingency mission plans
- Provides, as directed, dental care services in support of the Navy and Marine Corps units of the operating forces and shore activities to ensure the highest possible degree of operational readiness of these forces and activities
- Conducts appropriate education programs for assigned military personnel to ensure both military and dental health care standards of conduct and performance are achieved and maintained
- Participates as an integral element of the Navy and Tri-service Regional Health Care System
- Cooperates with military and civilian authorities in matters pertaining to public health, local disasters, and other emergencies

b. Branch Dental Clinic (BDC)

A BDC is a dental healthcare facility capable of providing comprehensive dental healthcare, but is dependent upon consultative, administrative, and financial support from its parent naval dental center, as assigned by the Chief of Naval Operations.

E. KEY PERSONNEL IN NAVAL DENTAL CENTERS

1. Commanding Officer (CO)

a. General Duties

The highest-ranking Dental Corps Officer in an NDC is the Commanding Officer (CO). He is charged with accomplishing the economic, effective, and efficient performance of functions and operations of the NDC and all clinics that fall within his

area of responsibility. He is responsible for the professional dental care and services given to all patients in the clinics, as well as the safety and well-being of the entire command. [Ref 3]

2. Executive Officer (XO)

a. General Duties

The executive officer (XO) is the second in command of the NDC and all dental clinics under the NDCs responsibility. He assumes command in the absence of the commanding officer. In performing his duties, the executive officer must conform to and effectuate the policies and orders of the commanding officer and must keep the commanding officer informed of all significant matters that pertain to the command. He is primarily responsible under the commanding officer for the organization, performance of duty, operational readiness, and provision of dental care services, training plan, and good order and discipline of the entire command. [Ref 3]

3. Director for Administration (DFA)

a. General Duties

The director for administration (DFA) is a Medical Service Corps officer responsible for the general administrative functions of the command. He is the principal staff advisor to the commanding officer, via the executive officer for the coordination and efficient operation of all functions relating to manpower, civilian personnel matters, enlisted training, and the implementation of policy and standards pertaining to management functions. He confers with the director, fleet and Fleet Marine Force support operations, director, dental services, director area dental laboratory, and all the directors of the branch clinics on matters of mutual concern. [Ref 3]

4. Director for Resources (DFR)

a. General Duties

The director for resources, also known as the comptroller, in a NDC is a Medical Service Corps officer. He is the commanding officer's primary advisor on all fiscal matters that include but are not limited to budget formulation and execution, and to the efficient allocation of supply, equipment, and material resources within the command. He manages administrative functions to include budgeting, accounting, manpower,

personnel, operating and facilities management, property procurement and distribution, Reserve affairs, and preparation of required reports, records, and correspondence. [Ref 3]

5. Branch Clinic Director

a. General Duties

The commanding officer assigns a director for every BDC. As the most senior Dental Corps officer in the clinic, he is responsible to the commanding officer for the coordination of clinical and administrative services, via the executive officer. All orders issued by the director, branch clinic, will be regarded as coming from the commanding officer. He confers with the director, dental clinic administration, the director, fleet and Fleet Marine Force support operations, director dental services, and director, area dental laboratory on matters of mutual concern. Figure 1 is the NDCGC organizational structure. [Ref 3]

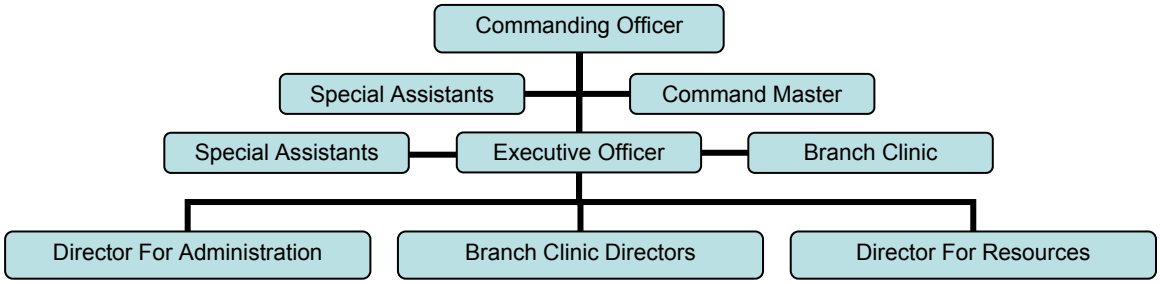


Figure 1. NDCGC Organizational Chart. [Ref 4]

F. THE PURPOSE AND PHILOSOPHY OF PERFORMANCE MEASURES

In the strategic management of an organization, it is important for that organization to have the following established: a stated, unified purpose for its existence, a future-state goal it is striving for, a process to create and deliver its products or services, controls to ensure that the processes are aligned with the organization's purpose, and performance measures to analyze how efficiently and effectively it is fulfilling its purpose, and whether it is moving toward its desired future state or not. Robert Simons says, "…effective managers rely on performance measurement and control systems to set direction, make strategic decisions, and achieve desired goals." [Ref 1] He further suggests that it is less necessary to have performance measurements and controls for very

small businesses because the number of staff personnel is so few that it is easy for managers to keep employees moving in the proper direction. A NDC's staff is numerous and performs vastly different jobs at several segregated locations. For this reason, it is imperative for NDCs to have performance measures and control systems to make certain that employees are moving in the same direction and fulfilling the overall organizational mission.

G. PERFORMANCE MEASURES IN THE GOVERNMENT

To move the federal government in the direction of fiscal responsibility, Congress passed the Chief Financial Officer's Act of 1990 and the Government Performance and Results Act (GPRA) of 1993. For this project, the latter piece of legislation is particularly influential. The GPRA mandates the use of performance measurements in government agencies to improve the overall process.

H. BUMED PERFORMANCE MEASURES

BUMED's Navy Dentistry office developed a set of metrics for NDCs to track and report back through their respective Healthcare Support Offices (HSO). The following is a list of only those metrics that will be used in our analysis and development of the ROCE model for NDCGC. The metrics are identified in detail.

1. BUMED Mandated Performance Measures for all Naval Dental Centers

a. Clinical Productivity

The objective of this metric is to determine the productivity of NDCs. The monthly metric is a ratio of "dental weighted values" (DWV) performed per month per number of full-time equivalents (FTE) of dental providers available. The American Dental Association developed DWVs. A DWV is a weighted value applied to different dental procedures to equate costs to procedures and increase comparability of procedures. DWVs vary in proportion to the complexity of a procedure. The more complex the procedure, the more FTEs are needed to produce it. This methodology gives a more realistic picture of outputs to the amount of inputs given to NDCs. [Ref 2]

b. Return on Investment

This metric determines the ROI at each BDC. The formula is as follows:

ROI = Return (sales revenue/expenses) / Investment

The sales revenue used in this analysis are derived from the American Dental Association's - Dental Weighted Value (DWV) unit calculation. This would be the equivalent revenue for the branch clinic if it were operating in a private setting. For example, a single tooth extraction is valued at $570 with a DWV of 5.7 times the multiplier of 100. The expenses used in this analysis are derived from the OPTAR reports that are submitted on a quarterly basis. The investment figures are derived from the comptrollers BDC investment report. [Ref 2]

2. Naval Dental Center-Specific Measures

NDC commands have developed the following metrics to provide performance information. The separate commands have also formulated and used these metrics in addition to the ones mandated by BUMED. Since these metrics are for their own use, the separate commands are not obligated to report them to BUMED.

a. Command Revenue

This metric measures the "revenue" of the NDC by department or clinic. The procedures performed in the clinics are given a dollar value. Dollar values are estimated with reimbursement rates used to retrieve funds from NATO and U.S. Coast Guard forces treated. By giving each procedure done in the clinic a theoretical dollar value, clinics' revenues are calculated. This metric was used at one particular NDC to increase competition among clinics. The NDC gave incentives to the clinics, such as special liberty, for achieving the highest revenue. Another metric is the Profitability metric. It is very similar to the command income metric in that it measures the revenue the NDC would have generated if they charged DWVs for their services. Per Capita Income is another similar metric. It is calculated by dividing total revenue by the total number of clinical FTEs reported in that period. The objective is to maximize per capita revenue generated by the number of available staff per clinic. [Ref 4]

b. DWVs per BDC per Month per Fiscal Year

There are a number of variations of this metric. This metric is, in essence, the metric included in BUMED's metrics. The difference between this metric and those used in BUMED's Composite Metrics is that it compares the current fiscal year production with previous fiscal year's production. This metric helps NDCs track trends and verify if the overall trend of production is increasing or not. This metric gives the

NDC total productivity with flexibility of "drilldowns" to answer specific questions and aid in further research. Another very similar metric is the Total Production Compared to the Target. The special aspect of this metric is it measures month by month the accomplishment of the command in relation to its yearly goal. This metric accentuates that metrics are most effective when measuring the accomplishment of a goal or the achievement of a strategy. Another productivity drilldown is the Percent Delta (change) in Total Production. This measure charts the percent change in total production from previous fiscal years. This is an attempt to normalize the data and analyze "apples to apples". [Ref 4]

c. Income Statement

The income statement measures the amount of "net income" that the NDC and clinics would receive if they collect the DWVs less the total amount of costs of resources used. [Ref 4]

d. Quarterly OPTAR Used

This metric measures the amount of Operating Target (OPTAR) within the NDC that has been obligated so far in the quarter. This metric is a quick look at the overall execution rate of the NDC as a whole. [Ref 4]

II. BRANCH DENTAL CLINIC CHARACTERISTICS

There are many unique situations at each BDC that must be fully understood and given special attention prior to making a decision to add, eliminate, or move assets between clinics in order to achieve a favorable or positive Return on Capital Employed (ROCE) among all the BDCs. All of the Branch Dental Clinics (BDC) within NDCGC are categorized into three groups: ships clinics, staff/student clinics, and specialty clinics. These groups are based on the disposition of the patients and their work center characteristics. The three categories are arranged such that the mix of sales revenue and capital employed can be optimized within a range assigned to each category. It must also be noted that there are unique situations in regard to expenses at the branch dental clinics. For example, the BDC Belle Chasse is a remote clinic located at the heart of the Mississippi River Delta. The access to contract dentists, hygienists, and dental assistants is very limited. Thus, this NDC incurs potentially higher expenses. Even if there were a need for a half time dentist, a full time military dentist would be sent to fill the position because there are no contract individuals willing to commute to the remote clinic. Therefore, overstaffing in the clinic may come out of necessity and not due to poor human resource management.

Following is a list of the BDCs and a short description:

A. SHIP BDCS

The clinics in this category, approximately eleven percent of command total patient beneficiary population, provide homeport dental treatment to ships stationed at their respective Naval Station. Within this category are BDCs Corpus Christi, Ingleside, and Pascagoula.

The clinics in the ship category serve Navy bases that have approximately ninety percent of patients stationed on ships. The predominant service provided at these clinics is general dentistry. These ships average six months at sea. To resource these clinics with the optimal level of personnel, supplies, and equipment may be largely dependent on obtaining ship's movement schedules when available. A shipyard of eight ships with an average deployment of six months equates to only, on average, half of the patients in port

at any given time. There have been instances of all but one ship being deployed at one time. However, that has happened only once in the last ten years. Periods of excess capacity are always followed by huge backlogs when ships end their deployments. The ship movement schedule drives the optimal resource level for these BDCs. There is no control of a ship's schedule and there is also very little lead-time in notification of ship's movement.

B. STAFF/STUDENT BDCS

The clinics in this category, approximately eighty four percent of command total patient beneficiary population, provide dental care to staff and students stationed at the installation. The ratio of staff to students is approximately 25% to 75%. The majority of students receive training in the disciplines of cryptology, aircraft maintenance and deep sea diving, to name a few. These clinics are located at Naval Air Stations, Joint Reserve Bases, and Naval Support Activities. Within this category are BDCs Belle Chasse, Corry Station, Fort Worth, Gulfport, Kingsville, Mid-South, Meridian, Naval Air Technical Center Pensacola (NATTC), Panama City, and Whiting Field.

At these BDCs there is a steady flow of patients and fluctuations in patient flow is negligible.

C. SPECIALTY BDC - PENSACOLA

BDC Naval Air Station Pensacola houses the specialists of the command in the disciplines of periodontics, endodontics, orthodontics, and dental surgery. These specialties require relatively expensive equipment and highly skilled labor force as compared to all other clinics. Demand for this kind of dental care is extremely difficult to predict. However, there is a requirement for the command to provide such specialty dental care to the patient population throughout the command. Patients at other BDCs in need of specialty dental care are transported to BDC Pensacola for that care. There is low to moderate variability in patient flow.

III. THE APPROPRIATE MODEL

Since the Return on Investment (ROI) ratio does not separate assets beyond managerial control, the analysis of financial and managerial efficiency in this report is based on Return on Capital Employed (ROCE). As previously mentioned, individual managers in dental clinics have no control over their respective fixed assets, the buildings in particular, so ROI use would be inappropriate in this case. The breakdown of ROCE is as follows:

$$\text{ROCE} = \frac{\text{Net} \cdot \text{Income}}{\text{Sales} \cdot \text{Revenue}} \times \frac{\text{Sales} \cdot \text{Revenue}}{\text{Capital} \cdot \text{Employed}}$$

The first term (Net Income/Sales Revenue) is often referred to as a ratio measure of profitability or return on sales. It ties together management's ability to generate profit in relation to work performed. Since NDC have no sales revenue, per se, and the volume of work performed is limited by actual patient demand, the first term acts as a measure of management's ability to control costs. Personnel costs constitute approximately 80% of all overall expenses. Therefore, the ratio will be a primary indicator of the BDC's ability to control personnel expenses.

The second term (Sales Revenue/Capital Employed) is referred to as the asset turnover ratio. This ratio may serve as a measure of the utilization level of equipment. This assumes that every clinic maintains constant level of safety stock of inventory, thus making inventory level irrelevant.

BDCs management will eventually need to take into account all of the variables that may lead to a change in ROCE for every clinic. The variable components of the ROCE model are sales revenue, net income, and capital employed. The variable components of the model are described in the following sections.

A. SALES REVENUE

Sales figures used in this analysis are derived from the American Dental Association's - Dental Weighted Value (DWV) unit calculation. The amount of DWV units for each clinic are recorded on a monthly basis and then multiplied by 100 in order

to give a sales revenue figure in dollars. This would be the equivalent revenue for the branch clinic if it were operating in a private setting. For example, a single tooth extraction is valued at $570 with a DWV of 5.7 times the multiplier of 100.

B. NET INCOME

Net Income is equal to sales revenue less all expenses (aggregated)

We exclude taxes and interest expenses from the equation because dental clinics as a part of government are not obligated to pay taxes. They also do not borrow money. Therefore, cost of capital seems to be irrelevant in this case. However, the money the dental clinics use comes from the Federal Government, which has to borrow money resulting in public debt. The operating expenses are identified as follows:

1. Personnel Expenses

Personnel expenses are the largest portion of total expenses accounting for approximately 80% of all expenses. The three components of personnel expenses are:

a. Military Pay

Military Pay includes all basic pay, bonuses and all non-taxed entitlements for all active duty and reservists assigned to BDCs. The source of the data is the Navy-wide Standard Accounting Reporting System-Field Level.

b. Government Service (Civilian Pay)

Civilian Pay includes all payments to employees assigned to BDCs. The source of the data is Navy Medicine's Summarized Management Analysis Resource Tool.

c. Personal Service Contract

Personal Service Contract includes all contract payments to contract employees and is reported at each BDC. The source of the data is NDCGC's Personal Service Contract Data Base.

Management has some direct control over these expenses through their potential ability to move personnel from one clinic to another. However, this movement is constrained due to transferability of dentists and technicians. For example, military dentists and technicians are on orders for up to three years and are not considered moveable until their tour is over. However, once the tour is over, the dentists or

technician billet may not be filled and it can be transferred to another clinic in need, or it is converted into a contract. BDCs that are located in the same vicinity, (e.g. within twenty five miles from one another), can transfer military human capital more efficiently than the clinics that are in isolated locations.

2. General Expenses

General expenses consist of a roll up of many expenses that are tracked at the BDC and the resource directorate level. The expense components include printing, utilities, equipment, communications, travel, and dental services outsourcing (prosthetic purchases). General expenses account for approximately 2.5% of total expenses.

3. Consumable Expenses

Consumable expenses consist of all supplies that are used in the course of treating patients. Examples are disposables, which include drill bits, procedure drapes, surgical medications and anesthetics, x-ray film, and x-ray film developer. This also includes any supplies that are used in support of administration of the BDC's front desk areas and dental treatment rooms. Consumable expenses account for approximately 8% of total expenses.

4. Overhead Expenses

Overhead expenses consist of all costs related to the operations of the headquarters and dental repair functions of the command. The comptroller allocates these expenses to every BDC based on the number of dentists treating patients at each BDC. Overhead expenses account for approximately 11% of total expenses. The Naval Dental Center Gulf Coast (NDCGC) has control over those expenses.

C. CAPITAL EMPLOYED

In the ROCE equation, Capital Employed (CE) refers to the assets within the managers' direct control. Thus, CE for the BDCs consists of equipment and inventory. Short descriptions of these are as follows:

1. Equipment

The total value of equipment at each BDC is based on the amount that is listed in the Defense Property Accountability System (DPAS). The BDC manager validates DPAS for accuracy on a quarterly basis and all new equipment is input in the system at original purchase price, which is considered to be the market price.

2. Inventory

The inventory on hand at each BDC is estimated to be on average one and one half months consumable supply inventory. Examples of common inventory stocks at the clinics are disposables, which includes drill bits, procedure drapes, surgical medications and anesthetics, x-ray film, and x-ray film developer. Cost increases for inventory follow average inflation from year to year. The value of the inventory for each month will be estimated at one and one half months consumable supply Operating Target (OPTAR) amount that is fully expended at the end of each month.

It should be noted that the BDCs do not manage cash; therefore, it is not considered for input into the CE total for the ROCE model.

IV. ASSUMPTIONS

Applying the ROCE model requires making some general assumptions. Some of them are due to special characteristics of dental clinics listed in Chapter II. The purpose of the assumptions is to compensate for any deviations between BDCs based on their mission so that the clinics can be assessed in an objective manner. While these assumptions try to reach a standardized way of analysis, one cannot use the ROCE model without careful and thorough investigation of every single management situation.

Other assumptions are introduced to make the model as simple as possible, without jeopardizing the validity of the results. They focus mainly on the application of accounting principles and adaptation of the managerial perception of raw data gathered from the source.

The following is a list of assumptions applied to the ROCE MODEL:

A. TIME FRAME

The calculation of ROCE is based on a one-year time-frame, because the patients' flow follows an annual pattern. This is especially true for ship category clinics, where patients' flow depends heavily on the schedule of ships coming from deployment. Periods of low activity are followed by periods of huge backlogs. There is little or nothing management can do about this. If stretched over less than one year, the ROCE model would indicate relatively low assets utilization for clinics temporarily in the low activity periods and relatively high assets utilization for clinics with backlogs. The evaluation based on such data would not be objective. Therefore, the ROCE model encompasses a period of one year to become independent from seasonal fluctuations.

B. PATIENT POPULATION

The ROCE model assumes that the patient population in each dental clinic category (i.e. specialty, ship, staff/student clinics) has the same dental treatment needs characteristics regardless of BDC location. The model does not recognize demographical differences like age, dental habits, fluoridation, etc. The model does not take into cognizance differences in dental characteristics of patients between categories, which may be the case when comparing specialty category clinic and ship category clinics. One

can recognize that specialty category clinics would mostly treat an older population with complicated problems and a large portion of ship category clinics' patients would be young sailors with treatments limited to easy-to-perform operations.

C. FACILITIES

NDCGC has no discretion over the location, size and/or configuration of the buildings their clinics occupy. Therefore, buildings are excluded from managerial control and are not part of the CE total.

D. DEPRECIATION AND CAPITALIZATION

Dental clinics do not capitalize and depreciate equipment valued less than $100,000. Since there is only one piece of equipment exceeding that value, the ROCE does not include depreciation.

E. EQUIPMENT VALUATION

Valuation of the equipment used to calculate CE equals the average purchase (which is considered market) value of equipment at the beginning of the accounting period and at the end of the accounting period. The accounting period for dental clinics is one year.

F. MILITARY DENTIST TIME AVAILABILITY

For those who want to compare the ROCE of NDCGC to that of the private sector, it must be noted that military dentists work on patients only 80 percent of the time. The rest of the time is sacrificed for collateral duties, which consist of military and administrative related activities. Thus, ROCE cannot be compared with other systems being used in private practice.

V. ANALYSIS

The purpose of this report is to provide the management at the BDCs with a useful tool to analyze every clinic's performance. The ROCE model is a widely used method found to be more useful in the corporate world. It measures the rate of return that BDC's managers are able to generate on their Capital Employed.

Although ROCE is widely used in evaluating performance, it is not a perfect tool [Ref. 5]. In the case of BDCs, a critical imperfection lies in the fact that ROCE is not used primarily to boost revenues. As a matter of fact, it is not ROCE's ultimate goal. The BDCs mission is to provide:

> …comprehensive dental services to Navy and Marine Corps units of the operating forces, shore activities, and other authorized personnel in the assigned geographic area as prescribed by Title 10, U.S.C., and other applicable directives [Ref. 4]

Clearly, the BDC mission is not profit generation only. Therefore, while striving to achieve maximum financial performance, the BDCs' managers have to balance the mission requirements with their performance measures. BDC management's motivation is to achieve the best ROCE outcome given the unique characteristics within the respective clinic category, and to also carry out the mission as prescribed. In order to better understand the relationship between the BDCs' financial performance and the level of service provided, accessing theoretical process capacity within each BDC must be discussed.

The BDCs access theoretical process capacity by:

- Identifying all appointed visits by type
- Identifying the time necessary to fulfill the requirements of the appointed visits by type
- Identifying the scheduled availability of each resource available to execute the appointed visits by type

- Identifying the overall number of resource units (i.e., OPTAR, personnel, equipment, treatment rooms) within the BDC

Management will be able to calculate the theoretical process capacity and compare it to the current throughput of the BDC to indicate the extent to which resources are utilized to generate sales revenue. The formula is as follows:

Capacity utilization = Current throughput / Theoretical capacity

The ROCE model blends together many aspects of the manager's responsibilities into a single figure. That ROCE figure can be compared to the ROCE figures of other BDCs, commercial clinics, and to the future ROCE figures of the BDC. Managers must learn how to identify ways to increase and control ROCE. [Ref. 5]

A BDC manager can increase ROCE in various combinations of one to three factors:

1. Increase sales revenue.
2. Reduce expenses.
3. Reduce Capital Employed.

A. INCREASE SALES REVENUE

A BDC's Sales Revenue depends on demand. No BDC can increase their sales revenue more than sales revenue attributable to the actual demand arising from the dental needs of the population. In other words, the clinics cannot solicit more business, but must process all available dental visits quickly. BDC theoretical capacity is its maximum sustainable flow rate if it were fully utilized during its scheduled availability. [Ref.6] However, every BDC should pursue the goal of satisfying the needs of patients by eliminating as many constraints as possible. A constraint is anything that prevents a clinic from maximizing the amount of patients treated. Constraints are bottlenecks in the process. There are three significant bottlenecks that can occur:

1. Lack of dentists.
2. Lack of technicians.
3. Lack of equipment.

For the sake of mission fulfillment, it is desirable to eliminate every possible constraint. It can be assumed that those particular clinics, which do not have waiting time, have no effective bottleneck, either. However, to achieve that state, they may have excessive capacities in personnel and in equipment. Excessive capacities mean that the clinics maintain more people and equipment than necessary to satisfy patients' needs. Excessive personnel capacity results in higher personnel expenses. Excessive equipment capacity results in higher CE. Both of them are undesirable from a financial performance perspective.

B. REDUCE EXPENSES

The largest portion of expenses is personnel expense, which account for about 80 percent of all expenses. Thus, they require the highest management attention. The level of staffing should ensure that all patients' needs are satisfied. Therefore, management might have a tendency to overstaff the clinics, anticipating an unpredictable peak in demand. Since the personnel expenses significantly influence the ROCE measure, the overstaffed clinics will show low values of the first ratio (Net Income/Sales Revenue) of the ROCE equation.

It would be management's responsibility to examine every particular case and determine whether the personnel expenses result from too many dentists or technicians. It may be helpful to remember, that the American Dental Association recommends a dentist/technician ratio of 2.5. However, it should also be noted that, unlike the commercial clinics, the BDC management has little control over payroll expenses. Separate provisions regulate military pay and there is little that management can do about it except requesting lower grade (pay-grade) dentists when filling the next billet.

C. REDUCE CAPITAL EMPLOYED (CE)

The CE consists of the total value of equipment and the average value of the inventory on hand at each BDC. The amount and the value of equipment are largely determined by forecasted demand and the main principle behind this policy is to enable the BDC to satisfy all the patients' needs. As in the case of personnel, some BDCs may have a tendency to maintain too much equipment given their demand level, anticipating sudden peak in demand. However, in a downturn period, equipment would stay idle and

therefore would not generate any additional sales revenue most of the time. That would cause the second ratio (Sales Revenue/Capital Employed) of the ROCE equation to decrease.

The value of the inventory is estimated to be on average one and one half months consumable supply inventory. This is because the BDCs introduced the policy of maintaining safety stock of inventory equal to one month's consumption along with monthly replenishments. While this policy does not require much managerial effort, one has to remember that the inventory value has direct impact on the second ratio (Sales Revenue/Capital Employed) and, therefore on the ROCE value.

D. SERVICE LEVEL

One primary goal of a BDC is to satisfy the actual demand in accordance with their mission:

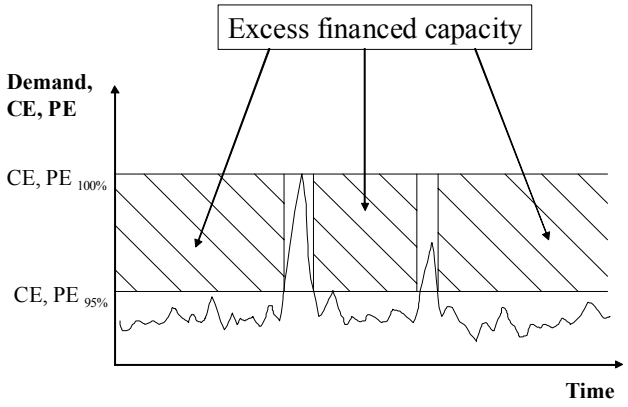
> [BDC] provides comprehensive dental services to Navy and Marine Corps units of the operating forces, shore activities, and other authorized personnel [Ref. 4].

However, there is a lot of leeway for management to interpret the definition of 'comprehensive dental services'. For example, one BDC may be equipped and staffed well enough to perform almost every kind of dental surgery. However, unusual or difficult cases do not appear often, causing the specialized and expensive equipment to stay idle most of the time. Another BDC may routinely send their patients to the Specialty BDC because its definition of 'comprehensive service' is not wide enough to justify purchase of specialized equipment.

One can assume that the difference in the amount of Sales Revenue between these two clinics would not be large enough to compensate the first one for the increase in Capital Employed and the increase in Personnel Expenses. Thus, the first clinic would have a lower value of ROCE than the second clinic.

Waiting time as a measure of 'comprehensive service' may even be more important. For example, the first clinic has the policy to treat every patient no later than the next day after sign-in. In other words, 100% of patients get treatment within one day. The second clinic may have a policy that 95% of its patients usually get treatment within

one day. The rest will have to wait several days, but never longer than 2 weeks. The percentage of patients treated within one day, given that all patients get treatment within 2 weeks, will be called the "service level". Figure 2 explains the difference in the amount of Capital Employed and Personnel Expenses necessary to provide 95% and 100% service level.



CE – Capital Employed
PE – Personnel Expenses
CE, PE $_{100\%}$ – CE and PE to ensure 100% level of service
CE, PE $_{95\%}$ – CE and PE to ensure 95% level of service

Figure 2. Excess capacity resulting from peaks in patients flow

The Figure 2 depicts exemplary patient flow (demand) over time. The characteristic of this patient flow may be the closest to that of the ship category clinics. Peaks corresponding to the ships returning from deployment follow periods of low and relatively steady demand. The clinic with the policy of 100% service level has to finance enough capacity to cover all peaks in demand. However, the capacity would be underutilized most of the time and the resulting ROCE value would be low. In practice, a lower service level, such as 95%, would improve the ROCE value while still meeting patient demand with minimal patient backlog. However, an inadequate level of service will lead to problems when ships return from deployment. The lack of equipment and personnel will result in huge backlogs, some of which can be reduced by employing the Mobile Dental Van currently shared among the clinics.

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VI. OUTCOMES

The purpose of this project is to provide NDCGC an appropriate model to enable resource managers to evaluate financial and personnel assets at branch dental clinics. NDCGC has recognized over the past fiscal year that using the measure of Return on Capital Employed will give them the assessment of alternatives to optimize the use of resources.

A. ROCE

The ROCE figure provides the management at the BDCs with a single measure of effectiveness. The Figure 3 depicts the distribution of ROCE measures among BDCs Gulf Coast.

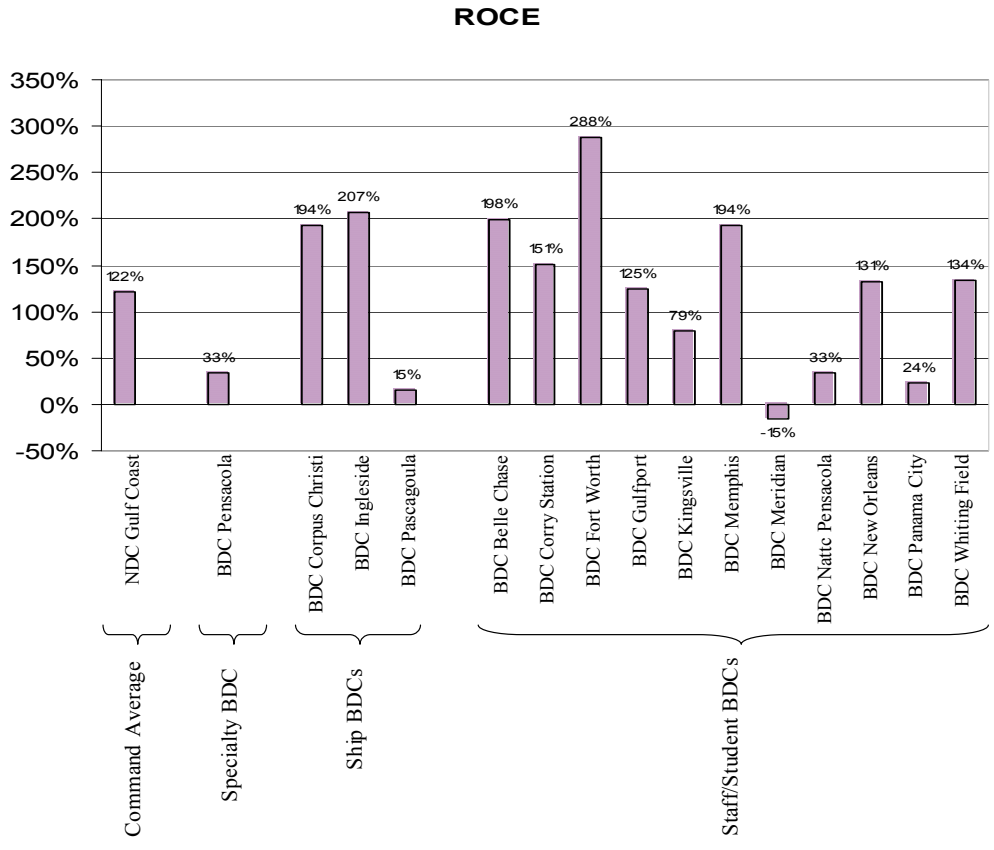

Figure 3. ROCE for dental clinics

The first bar corresponds to the average value for NDC Gulf Coast (the average for all clinics). Then, the graph groups all clinics into their respective category, starting from the Specialty Clinic to Ship Clinics to Staff/Student Clinics.

There are several facts that can be observed on the graph:

1. The Command average ROCE is 122%.
2. The range of ROCE distributions are from 288% to -15%.
3. There are 8 clinics with the ROCE higher than the average.
4. There is one clinic with the ROCE value equal to average.
5. There are 6 clinics with the ROCE values lower than the average.
6. One clinic has negative value of the ROCE (-15%).

Since the clinics have different characteristics, the analysis of the outcome has to be performed individually for every category (i.e. Specialty Clinic, Ship Clinics and Staff/Student Clinic categories).

1. Specialty Clinic

The largest of all BDCs, NAS Pensacola achieved a 33% ROCE. The value of the ROCE is way below the average. The management of BDC has to focus their attention on the reasons for such a low performance. Careful investigation of the two components of the ROCE equation should help them in their efforts.

2. Ship Clinics

The results of the three clinics reveal two clinics at 60% above the average, and one at approximately 10% the average command ROCE. BDCs Corpus Christi and Ingleside very efficiently utilize both their personnel and their capital. It specifically means that they employ the right mix of dentists, technicians and necessary equipment. The problem the management should try to resolve are the huge backlogs arising from peaks in demand. The outlier in this category is BDC Pascagoula with an ROCE of 15%, about 10% of the command average. As in the Specialty Clinic case, the management has to analyze the components of the ROCE equation.

3. Staff/Student Clinics

The results of the eleven clinics reveal three clinics as particular outliers: Meridian, NTTC Pensacola and Panama City. The outliers produced remarkably low ROCE totals compared to the command average, with the BDC Meridian being the lowest one with the ROCE of -15%. It is interesting that the range in this group was from 288% to -15% despite rather similar characteristic (Staff/Student Clinics). Definitely, the three outliers require special managerial attention. However, if the BDC Forth Worth ROCE may be set as a goal, the rest of the clinics from this category also have a lot to work on.

As previously mentioned, the ROCE model decomposes the ROCE equation into two terms (components):

1. Net Income/Sales Revenue
2. Sales/Capital Employed

This decomposition may be very helpful when analyzing the roots of low performance for every clinic. The following analysis especially focuses on low-performing clinics. However, the BDC management should follow the same pattern when analyzing every single case.

B. ROCE COMPONENTS

The first term of the ROCE equation (Net Income/Sales Revenue) acts as a measure of management's ability to control costs. Personnel costs constitute approximately 80% of all overall expenses. Therefore, the ratio will be a primary indicator of the BDCs ability to control personnel expenses. Figure 4 depicts the distribution of Net Income/Sales Revenue measures among BDCs Gulf Coast.

The second term (Sales Revenue/Capital Employed) is referred to as the asset turnover ratio. Since all BDCs introduced the same inventory control policy, this ratio may serve as a measure of the level of utilization of equipment. Figure 5 depicts the distribution of Sales Revenue/Capital Employed measures among BDCs Gulf Coast.

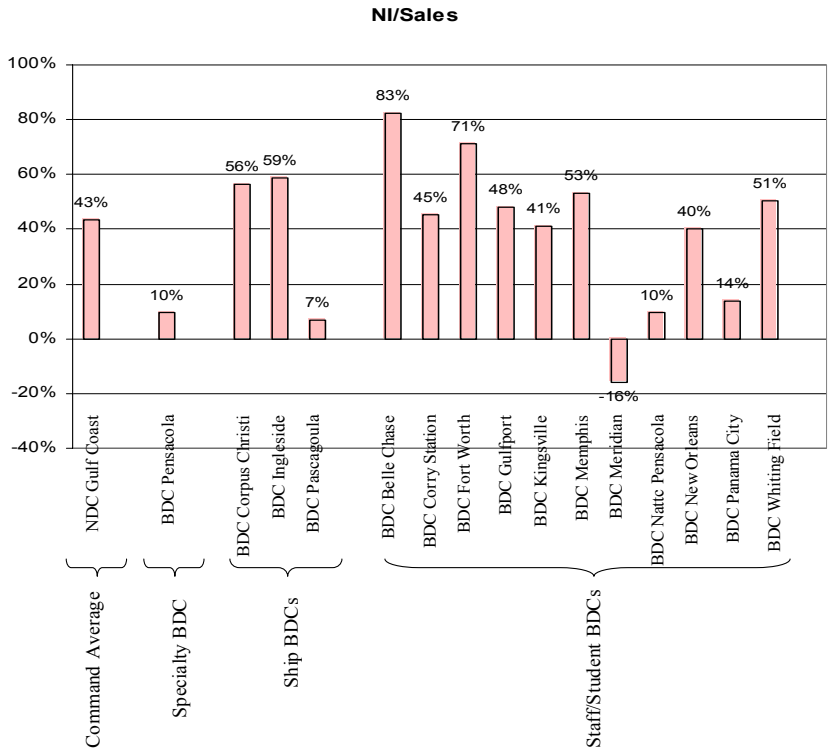

Figure 4. Net Income/Sales Revenue ratio for dental clinics

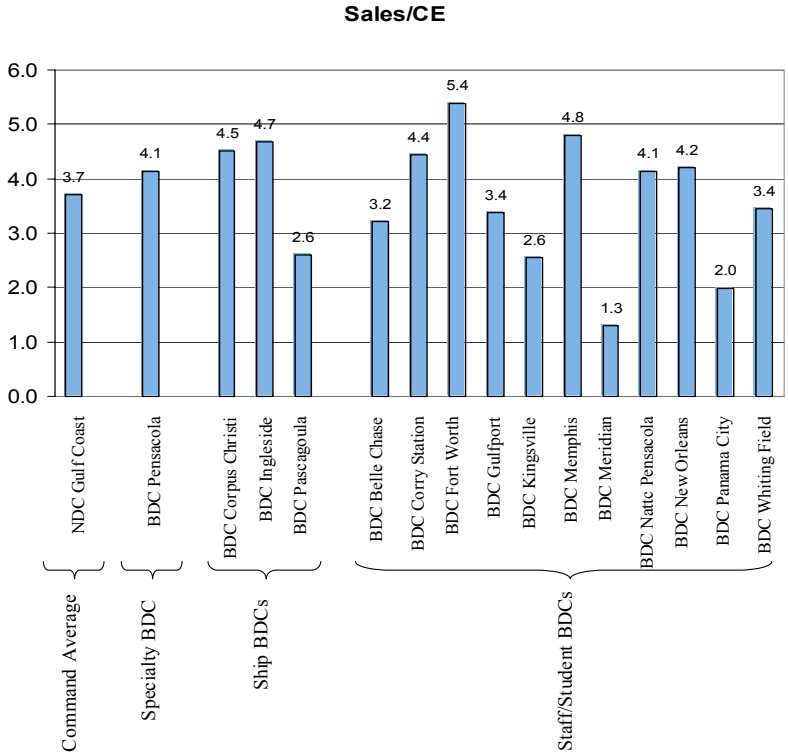

Figure 5. Sales Revenue/Capital Employed ratio for dental clinics

1. Specialty Category Outcome

BDC NAS Pensacola achieved only 33% ROCE, but obtained a Sales Revenue/CE ratio of 4.1, versus the average of 3.7. This may indicate that the clinic utilizes its capital in a decent way. What must be focused on is the 10% NI/Sales Revenue ratio, which is below the command average of 43%. It might be that the clinic is not controlling expenses, and in particular, not controlling personnel expenses (personnel expenses accounts for 80% of total expenses). However, it could also be that the relative cost overrun is due to highly qualified, thus highly paid, specialists. If that is the case, the relatively low ROCE resulting from low NI/Sales Revenue ratio may just be a normal sign for that category.

2. Ships Category Outcome

Investigating the root cause of the low ROCE for BDC Pascagoula reveals that the NI/Sales Revenue ratio is 7%, approximately, 15% of the command average. This may indicate poor control of personnel expenses, specifically excess personnel. Excess personnel may arise from the management belief that the clinic should be prepared to respond to every peak in demand. Thus, management might decide to maintain more than enough personnel to cover regular demand just to better satisfy patients' needs in the periods of backlogs. The Sales Revenue/CE ratio is 2.6 compared to the command average 3.7. This reveals moderate resource utilization. It seems that the clinic underutilize their resources compared to other clinics in its category. Again, the reason may be management's decision to sacrifice financial performance in order to better fulfill the clinic's mission.

3. Staff/Student Category Outcome

The results of the eleven clinics reveal three clinics as outliers: Meridian, NTTC Pensacola and Panama City. The outliers produced remarkably low ROCE totals compared to the command average, and produced NI/Sales Revenue totals of -16%, 10% and 14% respectively, well below the command average of 43%. What is interesting is that NATTC Pensacola scored rather well using the Sales Revenue/CE ratio, getting 4.1 versus the command average of 3.7. It certainly may be a sign of serious overstaffing, emphasizing that this clinic is adequately utilizing its capital. The other two outliers

scored well below the command average for the Sales Revenue/CE ratio. It is clear that these clinics are not controlling expenses, and underutilizing their capital.

C. CONCLUSION

We feel that the ROCE model is a good management tool for use in the BDCs. The ROCE model may act as a managerial tool to optimize the mix of sales revenue to expenses and capital at each BDC. The composition of the ROCE equation gives management a solid base to start careful examination of every single case.

The ROCE outcome revealed several outliers. Definitely, clinics management should focus attention on at least the three clinics in the Staff/Students Clinic category. It also should analyze the causes of low ROCE for BDC Pascagoula in the ship category. In relation to the Specialty Clinic, more detailed investigation is needed to properly evaluate its ROCE value.

VII. RECOMMENDATIONS

Based on the above research findings and discussion, several specific recommendations for BDC management have been identified as presented below:

1. Examine all BDCs regarding their best practices and establish a benchmark for ROCE within each category (specialty, ship, staff/student clinics) that every clinic would be obligated to strive to, achieve, and eventually improve. We have learned that since ROCE is composed of two interdependent ratios, composed of three factors, (Sales Revenue, Expenses, and Capital Employed), every clinic would have to find out the best combination of three factors in order to achieve the best ROCE given all its unique circumstances. While trying to establish benchmarks, the management of BDCs might want to apply the ROCE model to commercial clinics and examine their best practices. We have also learned that while comparing results, one has to remember various circumstances limiting the performance of military clinics. For example, the fact of assigning collateral duties to military personnel can decrease their overall efficiency.

2. Establish an achievable service level for each BDC. An example of that could be 95% patients treated within one day and a maximum waiting time of 2 weeks between sign-in and appointment. This established service level should balance the mission requirements of satisfying patients' needs and the requirements of cost effectiveness.

3. Perform cost-benefit analysis for introduction of cost-effective inventory management techniques. This improvement should decrease the value of Capital Employed, thus increasing the ROCE value.

4. Provide BDCs with a contingency capacity. The effect of patients' flow pendulum swinging from low activity to huge backlogs might be partially mitigated by wider use of mobile dental vans. For example, mobile centers could move between Ship Clinics according to the schedule of ships returning from deployment. Instead of maintaining excess capacities at every clinic, saved resources might be combined to purchase an appropriate number of mobile dental vans. Therefore, each ship category

clinic could maintain just enough capacity to cover the steady demand of low activity periods and get enough support to cover the peaks when ships are returning to base. To make the solution feasible, the management at the BDC should carefully analyze patterns and seasonality of patients flow and/or find out any solution allowing them to more precisely predict future demand.

A definition of 'comprehensive service level' for all Ship and Staff/Student Clinics should be prepared. Dental operations beyond the scope of the definition should be redirected to specialty BDC Pensacola. Benefits of this solution would include, but not be limited to, higher specialization, higher utilization ratio of specialized equipment, and lower professional requirements for dentists working in ship and staff/student category clinics.

VIII. AREAS FOR FURTHER STUDY

As discussed previously, this research study of the application of the ROCE framework was limited in scope to several research sites. Also, time and personal resources did not permit a full-scale investigation of the various factors involved. Below are suggested areas for further study by subsequent investigators.

1. A follow-up study of performance measures actively followed by NDCs and their relationship with the NDC mission would be appropriate. The goal would be to ensure that performance measures are used as controls to actively measure concurrent goals and are not prohibitive to the over arching mission of the command.

2. A study comparing NDCGC ROCE to ROCE outcomes of all other NDCs in BUMED is recommended. The purpose of this study would allow for a larger sample. It is especially important that the Specialty and Ship Clinics category have more ROCE outcomes for comparison and evaluation.

3. A similar study concerning performance measurement and resource management in Navy branch medical clinics could be applicable.

4. Non-financial measures of performance should be investigated to provide another set of metrics to compare with ROCE and its components. ROCE captures only financial data. There may be useful information revealed by non-financial measures such as length of wait, number of patients processed, and other measures.

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APPENDIX

ROCE SPREADSHEET

Ft Worth				
	OCT	**NOV**	**DEC**	**1st QTR**
Total DWV	2488	1969	1904	
INCOME: (Total DWVs x 100)	**$ 248,800.00**	**$ 196,900.00**	**$ 190,400.00**	**$ 636,100.00**
DIRECT EXPENSES:				
Military Pay	$ 72,038.94	$ 72,464.05	$ 54,669.30	$ 199,172.29
Civilian Pay	$ 6,577.00	$ 5,777.00	$ 6,056.00	$ 18,410.00
PSC (Misc. Contracts)	$ 12,502.58	$ 12,502.59	$ 12,502.58	$ 37,507.75
Personal Expenses	**$ 91,118.52**	**$ 90,743.64**	**$ 73,227.88**	**$ 255,090.04**
Consumable Supplies (OPTAR)	**$ 4,515.00**	**$ 4,515.00**	**$ 4,515.00**	**$ 13,545.00**
Utilities	$ 458.33	$ 458.34	$ 458.33	$ 1,375.00
Printing	$ 250.00	$ 250.00	$ 250.00	$ 750.00
Communications (Phones)	$ 20.83	$ 20.84	$ 20.83	$ 62.50
Travel (TAD)		$ 1,033.00		$ 1,033.00
Supp. Pros.	$ 833.33	$ 833.33	$ 833.34	$ 2,500.00
General Expenses	**$ 1,562.49**	**$ 2,595.51**	**$ 1,562.50**	**$ 5,720.50**
TOTAL:	**$ 97,196.01**	**$ 97,854.15**	**$ 79,305.38**	**$ 274,355.54**
INDIRECT EXPENSES:				
HQ Support (HQ Overhead & Repair)	$ 13,416.87	$ 13,416.87	$ 13,416.87	$ 40,250.61
TOTAL:	**$ 13,416.87**	**$ 13,416.87**	**$ 13,416.87**	**$ 40,250.61**
TOTAL EXPENSES:	**$ 110,612.88**	**$ 111,271.02**	**$ 92,722.25**	**$ 314,606.15**
PROFIT/LOSS	**$ 138,187.12**	**$ 85,628.98**	**$ 97,677.75**	**$ 321,493.85**
Equipment ($000)	$ 139.00	$ 139.00	$ 139.00	$ 139.00
Sales/Capital Employed				3.99
ROCE				**201.79%**

Fiscal Year 2002, first quarter

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